

ASME B107.25-2002
(Revision of ASME B107.25M-1996)

PLIERS: PERFORMANCE TEST METHODS

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers



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A N A M E R I C A N N A T I O N A L S T A N D A R D

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FOREWORD

The American National Standards Committee B107, Socket Wrenches and Drives, under the sponsorship of the American Society of Mechanical Engineers, was reorganized as an ASME Standards Committee and its title was changed to Hand Tools and Accessories. In 1996 its scope was expanded to include safety considerations.

The purposes of this Standard are to define test methods to evaluate performance of pliers that relate to the defined requirements in other B107 pliers standards.

This Standard is a revision of ASME B107.25M-1996 Pliers—Performance Test Methods. Principal changes in this Edition of the standard are the updated references and the elimination of test methods not referenced in other standards.

The format of this Standard is in accordance with *The ASME Codes and Standards Writing Guide 2000*. Requests for interpretations of the technical requirements of this Standard should be expressed in writing to the Secretary, B107 Committee, at the address below.

Suggestions for the improvement of this Standard are welcome. They should be addressed to the American Society of Mechanical Engineers, Secretary, B107 Main Committee, Three Park Avenue, New York, NY 10016-5990.

The requirements of this Standard become effective at the time of publication. This revision was approved as an American National Standard on November 8, 2002.

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Hand Tools and Accessories

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the B107 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B107 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings, which are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

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Attending Committee Meetings. The B107 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B107 Standards Committee.

PLIERS: PERFORMANCE TEST METHODS

1 SCOPE

This Standard details the purpose, apparatus, procedures, and performance specifications for the functional testing of pliers. It is intended to be used by manufacturers, purchasers, and other persons involved with evaluating pliers products. Test procedures described herein are used to evaluate conformance to performance requirements.

2 SAFETY

Many of the tests described herein are inherently hazardous and, therefore, adequate safeguards for persons and property shall be employed when conducting these tests. Refer to the "Guide for Hand Tools — Selection, Safety Tips, Proper Use and Care" for additional information.

3 NORMATIVE REFERENCES

The following documents form a part of this Standard to the extent specified herein. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below.

ASTM E18-00, Standard Methods of Test for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM E384-99, Test Methods for Microhardness of Materials

Publisher: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care

Publisher: Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591

4 DEFINITIONS

deflection: movement under load.

force: the action of one body on another body that changes, or tends to change, the motion of the body acted on.

initial load: a small force applied to the pliers handles during the hand load test prior to the major load.

load: mass or force, depending on use. A load that produces a force due only to gravity may be expressed in mass units. Any other load is expressed in force units.

major load: the force applied to the pliers handles during the handle load test intended to deflect the handles.

may: see *shall*, *should*, and *may*.

moment: a measure of the tendency of a force to rotate a body upon which it acts about an axis.

permanent set: the difference in distance, measured at a right angle to the centerline, between handles before and after application and removal of the major load (also known as plastic deformation).

room temperature: 60°F to 80°F.

scored surface: serrated or crosshatched surface to enhance gripping ability.

shall, *should*, and *may*: mandatory requirements of this Standard are characterized by the word *shall*. If a provision is of an advisory nature, it is indicated by the word *should*, or is stated as a recommendation. If a provision is of an optional or alternative nature, it is indicated by the word *may*.

5 TEST PROCEDURES

Unless otherwise stated herein, all test shall be performed on finished pliers. All parameters, such as loads, permanent set, and wire properties, shall be defined in individual pliers standards.

SAFETY WARNING: MANY OF THE TESTS REQUIRED HEREIN ARE INHERENTLY HAZARDOUS AND, THEREFORE, ADEQUATE SAFEGUARDS FOR PERSONNEL AND PROPERTY SHALL BE EMPLOYED IN CONDUCTING THESE TESTS.

5.1 Handle Load Test

5.1.1 Purpose. This test is used to measure the deflection and permanent set of the handles to ensure proper usability of the pliers.

5.1.2 Apparatus. The load application shall adequately support the pliers to ensure consistent loading and accurate measurement of handles loads. A typical device appears in Fig. 1.

5.1.3 Procedure. Remove comfort grips before testing. Apply loads perpendicular to the center line of the

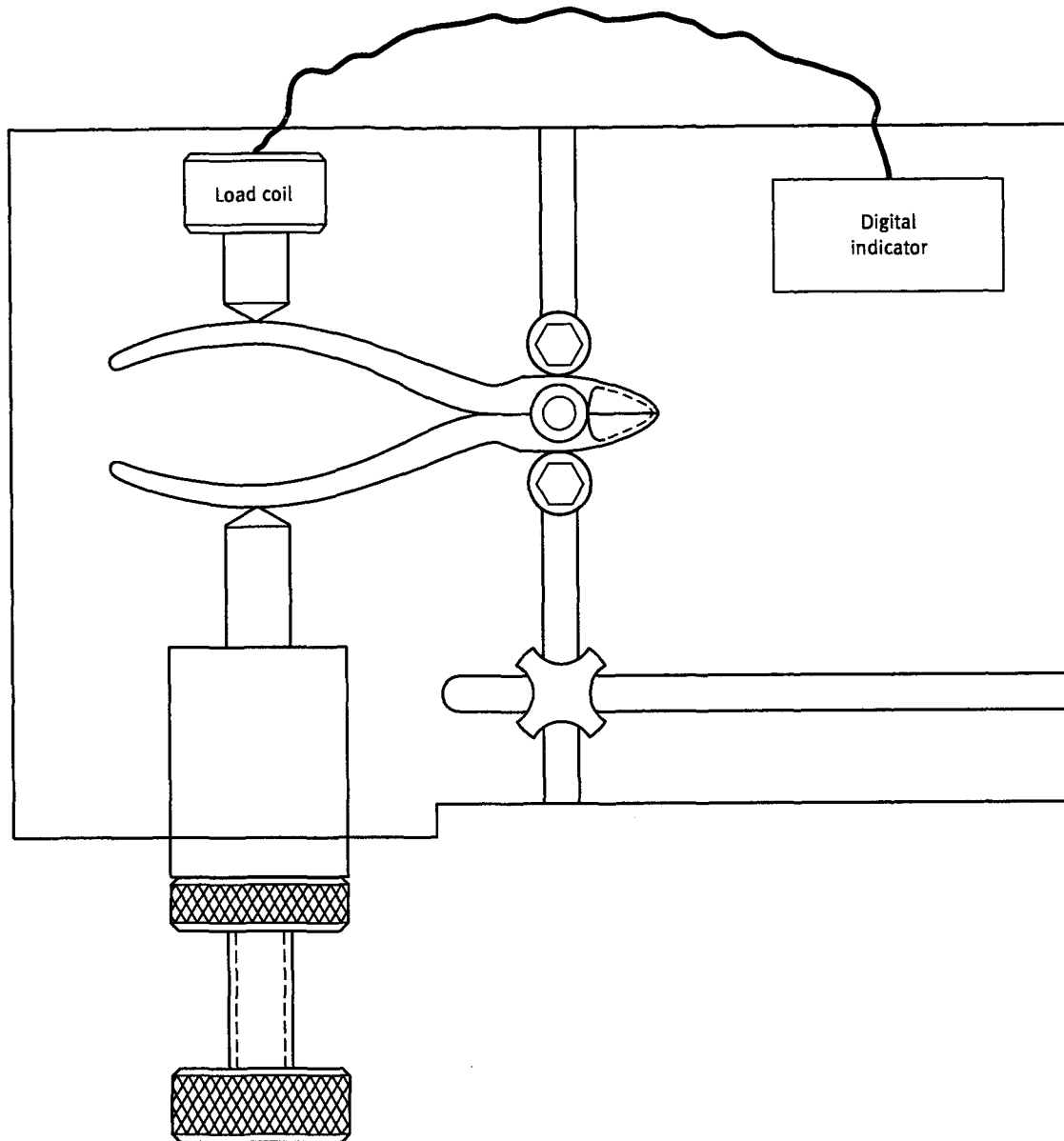


Fig. 1 Typical Apparatus for Applying Test Load to Handles of Pliers (Load Cell Measurement)

handle opening (see Fig. 1) at the location specified in individual pliers standards. Make a reference mark on the end of each handle for handle deflection and permanent set measurements. Apply the initial load of 5 lbf to the handles and measure the distance between marks with the handles loaded (measurement #1). Apply the major load specified in individual pliers standards and measure the distance between the marks with the handles loaded (measurement #2). Reduce the handle load to 5 lbf and measure the distance between the marks with the handles loaded (measurement #3). Calculate deflection by subtracting measurement #2 from measurement #1. Calculate permanent set by subtracting measurement #3 from measurement #1.

5.1.4 Specifications. Loading conditions, deflections, and permanent set requirements shall be in accordance with the applicable standard. Actual pounds force applied to the handles shall be calculated by dividing the moment in lbf-in. by the distance from the center of the pivot to the point of load application.

5.2 Cut Tests

5.2.1 Wire Cut Test

(a) *Purpose.* This test is used to evaluate the ability of pliers to cut.

(b) *Apparatus.* The load application device shall adequately support the pliers to ensure consistent loading and accurate measurement of handles loads during the

wire cut test. A typical device is shown in Fig. 1.

(c) *Procedure.* Cut uncoated, single strand, steel wire without bending, pulling, or twisting. Position the wire at right angles to the cutting edge. Individual pliers standards specify the handle loads, wire properties, and number and location of cuts.

5.2.2 Paper Cut Test

(a) *Purpose.* This test is used to determine whether cutting capability of the pliers has been compromised due to deformation of the cutting edges during the preceding wire cut test.

(b) *Apparatus.* Any load application device conforming to the requirements of para. 5.2.1(b) may be used for this test.

(c) *Procedure.* Cut 17-lb bond, 0.003 in. thick gil clear wood paper completely and cleanly, without any bending, pulling, or twisting. Use a maximum of 40 lbf (unless otherwise stated in the applicable standard) applied at the point of maximum handle curvature. The width of the paper shall be equal to the length of the cutting edges of the pliers $+0/-0.06$ in. The strip shall be centered between the ends of the cutting edges when the cut is made.

5.3 Pliers Hardness Test

5.3.1 Purpose. This test is used to measure the hardness of the pliers and to ensure proper performance of the product.

5.3.2 Apparatus. The apparatus for measuring hardness on pliers shall conform to ASTM E18 or ASTM E384.

5.3.3 Procedure. Rockwell hardness testing shall be performed in accordance with ASTM E18 or ASTM E384. When grinding is necessary to prepare the test surface, the amount removed (except for Microhardness test specimens) shall not exceed 0.007 in. on the surface contacted by the indenter.

(a) *Fastener.* Pliers may be tested in the assembled condition using the Rockwell C scale on the finished exposed surface. The test mandrel shall be of small enough diameter to support the fastener only, which will prevent errors during the test due to looseness of the fastener in the pliers body.

(b) *Jaws.* Pliers may be tested in the assembled condition using the Rockwell C scale on the finished exposed surface. The test mandrel shall be so shaped and/or the jaws properly prepared so that the area to be tested is adequately supported during the test to prevent errors resulting from movement of the pliers.

(c) *Cutting Edges.* Cutting edges shall have hardness readings measured using the Knoop or Vickers microhardness test in accordance with ASTM E384. Microhardness test specimens shall be prepared by wet cutting a section perpendicular to the cutting surface at the midpoint of the length of the cutting edge. The specimen shall be mounted and polished in order to ensure good

edge retention. Hardness measurements shall be taken within 0.005 in. of the cutting edge surface.

(d) *Handles.* Pliers may be tested in the assembled condition using the Rockwell C scale on the finished exposed surface. The test mandrel shall be so shaped and/or the handles properly prepared so that the area to be tested is adequately supported during the test to prevent errors resulting from movement of the pliers.

5.4 Joint Tests

5.4.1 Joint Integrity Test

(a) *Purpose.* This test is used to measure the joint's ability to resist loosening during normal use of the pliers.

(b) *Apparatus.* The apparatus shall adequately support the pliers to ensure consistent loading and accurate measurement of handles.

(c) *Procedure.* One handle of the pliers shall be clamped in a fixture. The load specified in the applicable standard shall be applied to the end of the unclamped handle in a direction parallel to the axis of the pivot, and the deflection of the unclamped pliers handle shall be measured with a suitable measuring device. The same load shall then be applied in the opposite direction and a second measurement taken at the same location. The total amount of deflection, divided by the distance from the axis of the pivot (center of fastener) to the point where the measurements were taken, shall not exceed the amount specified in the applicable standard.

5.4.2 Jaw Opening and Closing

(a) *Purpose.* This test evaluates the ability to open and close the jaws within specified force limits.

(b) *Apparatus.* The apparatus shall hold the pliers and include a suitable load-indicating device. A typical device is shown in Fig. 2.

(c) *Procedure.* One handle of the sample pliers under test shall be clamped in a vise with the pliers handles in a horizontal plane and a load shall be applied to the unclamped handle in such a direction as to open or close the jaws of the pliers. The load shall be applied in the plane of the handles by means of a suitable load-indicating device within 0.375 in. from the extreme end of the handle as shown in Fig. 2. The pliers jaws shall open and close through the required minimum distance listed in the applicable standard, with a load not to exceed the specified maximum (also in the applicable standard).

5.5 Solvent Resistance Test

5.5.1 Purpose. This test is used to ensure that nonmetallic components have adequate resistance to solvents encountered during normal use.

5.5.2 Apparatus. Any suitable container for the solvent may be used. Care should be taken to provide adequate ventilation of solvent fumes.

5.5.3 Procedure. Solvents tests shall be conducted at room temperature. The material being tested shall be

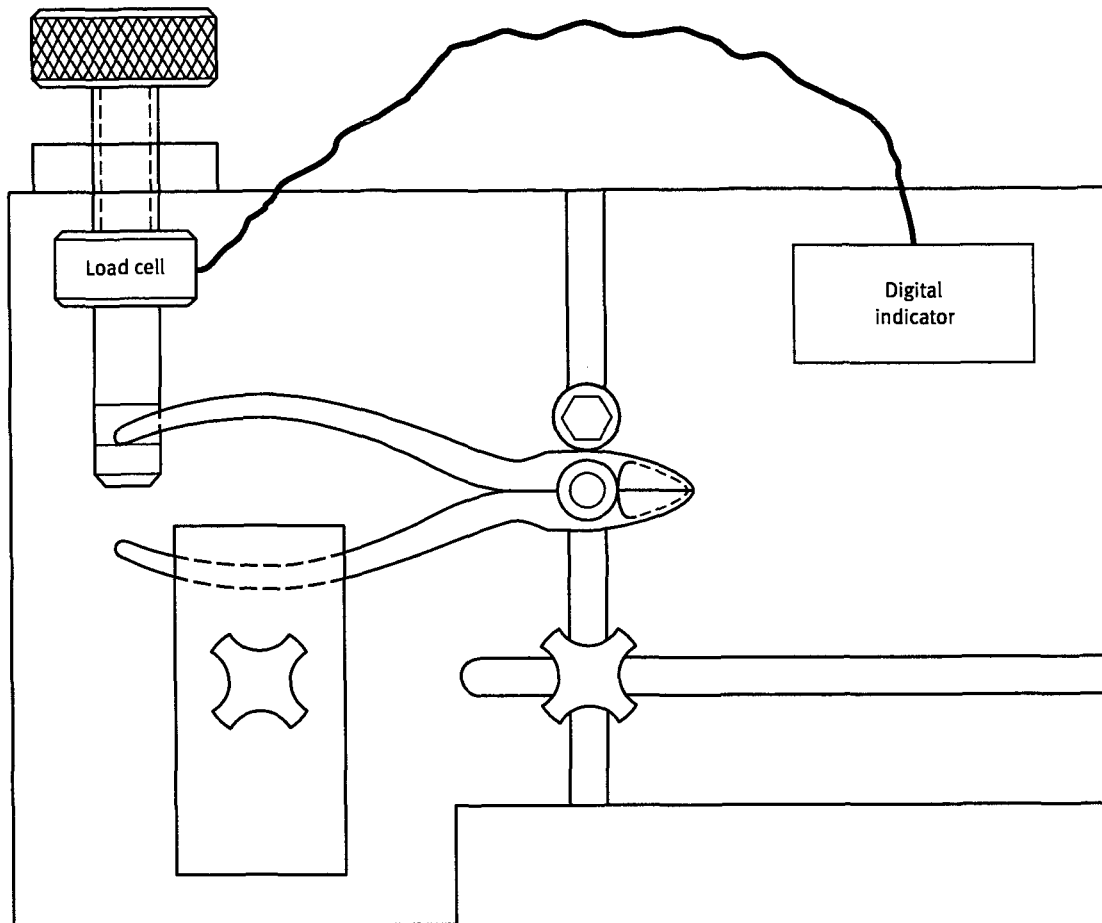


Fig. 2 Jaw Opening and Closing Test (Concept Design)

fully immersed in the test fluids specified herein. New samples shall be used for each test fluid. Samples shall be immersed for 15 min to 20 min, removed, and allowed to dry for 24 hr to 28 hr. Test fluids are SAE J1703 brake fluid, gasoline, ethylene glycol, and ethyl alcohol. There shall be no significant swelling or surface attack of the

material being tested. Comfort grips shall be tested while attached to the pliers handles. Cushion grip throats, inserts, and sleeves that are not dependent on friction or adhesives for attachment may be tested separately.

AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

Socket Wrenches, Hand (Inch Series)	B107.1-2002
Socket Wrenches, Extensions, Adaptors, and Universal Joints, Power Drive (Impact) (Inch Series)	B107.2-2002
Driving and Spindle Ends for Portable Hand, Impact, Air, and Electric Tools (Percussion Tools Excluded)	B107.4M-1995
Socket Wrenches, Hand (Metric Series)	B107.5M-2002
Adjustable Wrenches	B107.8M-1996
Handles and Attachments for Hand Socket Wrenches — Inch and Metric Series	B107.10M-1996
Pliers: Diagonal Cutting and End Cutting	B107.11-2002
Nut Drivers (Spin Type, Screwdriver Grip) (Inch Series)	B107.12-1997
Pliers — Long Nose, Long Reach	B107.13M-1996
Hand Torque Tools	B107.14M-1994
Flat Tip Screwdrivers	B107.15-2002
Shears (Metal Cutting, Hand)	B107.16M-1998
Gages, Wrench Openings, Reference	B107.17M-1997
Pliers (Wire Twister)	B107.18M-1996
Pliers, Retaining Ring	B107.19-1993(R1998)
Pliers (Lineman's, Iron Worker's, Gas, Glass, Fence, and Battery)	B107.20M-1998
Wrench, Crowfoot Attachments	B107.21-1998
Electronic Cutters	B107.22M-1998
Pliers, Multiple Position, Adjustable	B107.23M-1997
Pliers: Performance Test Methods	B107.25-2002
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Electronic Tester, Hand Torque Tools	B107.29M-1998
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Brick Chisels and Brick Sets: Safety Requirements	B107.50M-1998
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Heavy Striking Tools: Safety Requirements	B107.54-2001
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